

UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

**University-Community Makerspaces: Best Practice Review for the UBC Stadium Neighbourhood**

**Planning Through the Lens of Eight Case Studies**

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**PLAN 528A**

**Themes: Community, Buildings, Finance**

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# UNIVERSITY-COMMUNITY MAKERSPACES

## Best Practice Review for the UBC Stadium Neighbourhood Planning Through the Lens of Eight Case Studies

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Master of Community and Regional Planning

August 2019

Professional Capstone Report



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# EXECUTIVE SUMMARY

Campus and Community Planning staff (C+CP) at the University of British Columbia (UBC) is undergoing a planning process for the university's new residential community – Stadium Neighbourhood (SN). Located at the south of campus, the proposal for the 22 acre site comprises a built area of 1.5 million square feet. The program includes a rebuilt Thunderbird Stadium, residential housing, and public spaces, with supportive commercial and community uses. From internal staff discussion and community engagement feedback, there was interest in a flexible/makerspace for innovation, creativity, and community building. As a response, staff is exploring to dedicate a portion of the 60,000 square feet of academic and educational space in SN for a makerspace.

The purpose of this research seeks to identify best practices and successful precedents for integrating a makerspace into residential communities. C+CP staff acknowledged that there is currently a lack of case study precedents to guide this vision and describe what a self-sustaining makerspace could look like in SN. As a result, this research is guided by literature review, case studies, and semi-informal interviews. The goal of the future makerspace is to provide space primarily for area residents, but also be accessible to UBC students, faculty, and staff to exchange skills, knowledge, and establish an environment for community, learning, and innovation.

The emergence of the maker movement has created a catalyst for the makers culture, from hobbyists creating passion projects to start-up companies prototyping their products in makerspaces. This is especially important as cities aspire towards innovation and creativity, while the fostering of this culture spurs local economic development.

Through research, makerspaces regardless of size and type, are generally made up of three ingredients: tools, education, and community. Interviews with founders and staff of makerspaces revealed six strategies that are key

for a sustainable makerspace:

1. Business models help self-sustaining makerspaces;
2. Staff in responsible and management positions are key for operations;
3. Membership fees and institutional budgets allocation are the primary funding streams;
4. Cross-sectoral synergy is essential for planning process and marketing;
5. Community oriented and low barrier space create opportunities for informal learning and innovation; and
6. The space should be physically accessible and flexible to changes.

With a vision of establishing a SN makerspace for residents, strategic preliminary planning and governance are essential to the makerspace's sustainability.

This research informs preliminary planning of what a potential makerspace could look like at SN. However, further research could:

- Conduct research of small-scale collective resource spaces, such as the Vancouver Tool Library, and consider piloting pop-up makerspaces to engage the community;
- Consider partnerships with faculties and external entities, such as the Faculty of Education, Faculty of Applied Science, and the Vancouver Public Library, who play a role in facilitating design thinking, technology skills, and community spaces;
- Conduct research of planning policies and incentives that support makerspaces; and
- Examine land use restrictions and building design as an approach to address noise and odour concerns.



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Photo credit: Emily Huang



# INTRODUCTION

Campus and Community Planning (C+CP) at the University of British Columbia (UBC) is currently undergoing a planning process for the UBC Stadium Neighbourhood (SN). The SN plan proposes 1.5 million square feet of built space in the southern part of campus. The 22 acre site is bounded by East Mall and 16th Avenue, and includes the current Thunderbird Stadium. The program includes a rebuilt stadium, residential housing, and public spaces, with supportive commercial and community uses. SN is the next neighbourhood to be developed on UBC's neighbourhood lands (Figure 1: UBC Land Use Plan, Schedule A).

The vision for a makerspace aligns with UBC's Strategic Plan, *Shaping UBC's Next Century*, grounded in inclusion, collaboration, and innovation. This pushes UBC to be a university that works across disciplines and is at the forefront of creativity, entrepreneurship, and design thinking. Aspirations for SN are also shaped by C+CP's planning principles, particularly building long-term value, creating a community for and of UBC, being a great neighbour, and designing for flexibility and resilience. These vision, goals, and principles form the interest for a makerspace at SN for thriving campus communities that are attractive to work, learn, and play.

C+CP staff have also been interested in having a makerspace for its residents and how makerspaces foster innovation, community building, and supports campus as a living laboratory while attracting talent. Internal discussions involved how this will take shape, the typology of the makerspace, and whether this space could be shared with UBC students on campus. Staff is particularly interested in a makerspace that is catered towards residents because there is already an appetite and strong makerspace culture on campus. Blair Satterfield, faculty member at The School of Landscape Architecture (SALA) and director of HiLo Lab, is at the forefront of digital design and fabrication processes. The Lab is an example where students are actively learning and applying design thinking skills to their projects (See Appendix A map for current UBC workshop locations). With a focus on a makerspace for the residential community, C+CP staff

identified University Neighbourhood Association's (UNA) two community centres - Westbrook Community Centre and Old Barn Community Centre, both of which have underutilized spaces. This sparked a conversation for possible makerspace or tool library opportunities, while exploring various options as well.

Through community engagement, consultation with technical experts, and internal staff discussions, C+CP staff identified a number of key issues and opportunities for the SN plan. These include, but are not limited to, affordable housing, biodiversity, community amenities, and social spaces.

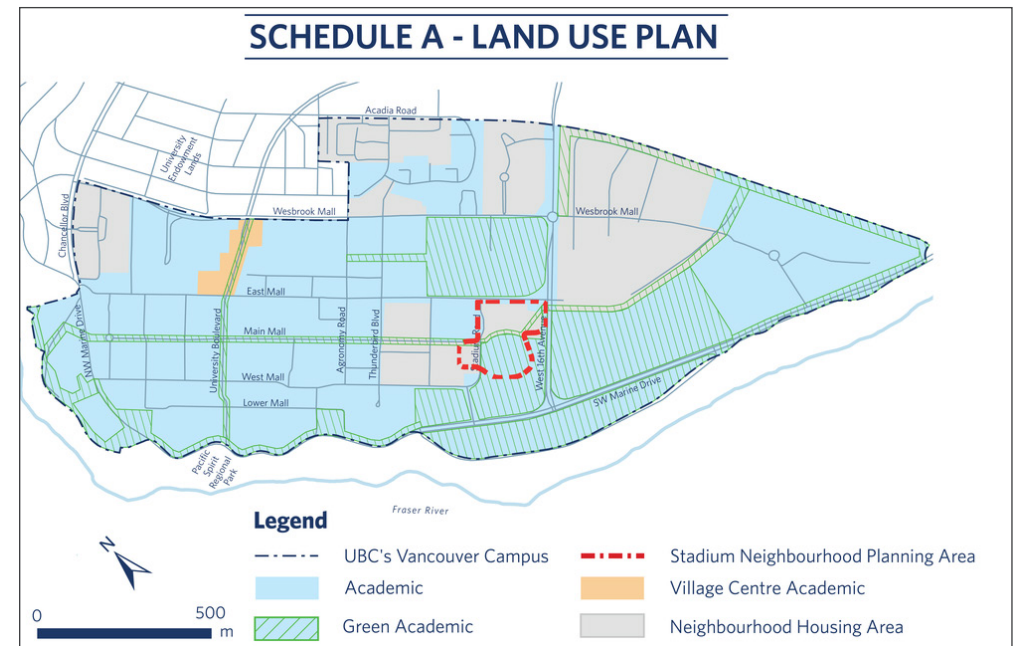


Figure 1: Schedule A - Land Use Plan, UBC C + CP

# Community Engagement

With internal staff discussion, this led to a community engagement process. Feedback indicated a desire for amenities that can integrate neighbourhood and university life through innovative learning and research approaches. Community members also voiced interest in creative and flexible space for making, doing, and swapping goods. Other examples include academic uses, such as extended learning facilities, design and build workshops, public service facilities, and collaboration and incubator spaces.<sup>1,2</sup>

From the engagement, the idea for a makerspace in SN is being explored by C+CP staff. While the hope for these spaces is to enhance long term social sustainability, community building, and innovation, the typology and form is still unclear.

The establishment of a makerspace can also be essential in attracting the type of community that UBC aspires toward – as a progressive, innovative, and sustainable living laboratory.



Photo credit: UBC C + CP

# PURPOSE

The purpose of this research stemmed from C+CP staff's awareness that there is no makerspace on UBC campus dedicated for residents. This is contrasted to the City of Vancouver where there are a number of makerspaces, such as MakerLabs, that cater to Vancouverites. The goal of the future makerspace at SN primarily focuses on providing space for residents, but to also be accessible for UBC students, faculty, and staff to exchange skills and knowledge, and establish an environment for community, learning, and innovation.

This research seeks to identify best practices and successful precedents for integrating makerspaces into residential communities. The findings will inform C+CP planning decisions on this vision and how a self-sustaining makerspace could look like in SN. As a result, this research is guided by literature review, case studies, and semi-informal interviews.

The original goal of this project was to interview an equal number of makerspace and coworking space case studies. However, there is only one coworking space (the HiVE) that was interviewed during the process. Since there are valuable lessons drawn from the HiVE, it was decided that this case study would be included for this research. For simplicity, the term 'makerspace' is used in this report, rather than 'makerspace and coworking space'.

## What are Makerspaces?

*"Makerspaces provide a place for anyone to design, construct, and test their idea, invention, or vision. Makerspaces often include tools and equipment that are too expensive or specialized for most people to own, and provide a gathering place for like-minded people to create, collaborate, and explore."*

-Winnipeg Library Foundation

## What are Coworking Spaces?

*"Coworking is not just about the sharing of infrastructure and cost, it is about belonging to a community, accessibility and sustainability. Coworking is the new way of working and sharing. Coworking spaces are designed to provide a productive and collaborative environment for their dynamic inhabitants and created without corporate constraints on what is perceived to be an "office" environment offering flexible memberships to suit most needs."*

-Coworker





# LITERATURE REVIEW

The emergence of makerspaces is grounded in the maker movement that took momentum in 2005, a movement that emphasizes making and learning through doing.<sup>3</sup> The maker movement led makers to create their own market ecosystem and develop innovative products. This movement empowers people through access to knowledge, tools, and technology – grounded in a culture of collaborative working environments.

As cities and communities aspire towards innovation, creating physical spaces for people to come together to exchange ideas and cultivate collaboration is essential. Makerspaces foster social capital by sharing resources, tools, and mixing of ideas, which in turn strengthens local economic development.<sup>4</sup> Traditionally, tools include 3D printers, laser cutters, and traditional hand tools; however, sewing machines, cameras, and computer software are also common in today's makerspaces. They provide access to people to tinker, make, and prototype ideas into action in an open, informal learning environment which is often described as a third space.<sup>5,6</sup> Fostering a culture of making, rather than buying and where learning and skills are life long and intergenerational are also aspirations of these spaces.<sup>7</sup> Makerspaces are present within communities, libraries, museums, and academic institutions, and continues to be established throughout cities and communities. Mark Hatch, a leader in the maker movement, describes makerspaces as “the most creative hub of activity in every city where it opens” (2013).<sup>8</sup>

*“Makerspaces contribute to economic development by providing ecosystems in which individuals can develop the workforce skills needed in today's manufacturing sector. By serving as an informal introduction to skilled trades through the use of tools as an educational and leisure pursuit, makerspaces expose individuals of all ages to modern, advanced tools. In doing so, makerspaces reinvigorate the mechanical arts on a community level.”*

-Calgary Economic Development

In addition to makerspaces operating as an individual entity, they are also found in libraries, public schools, and universities, as a response to the changes in student education that value design thinking and informal learning.<sup>9</sup> This is contrasted to the formal learning that happens in classrooms. As a result, these spaces often revolutionize education where the learner and teacher binary are blurred.<sup>10</sup> This sets students up for the changing job market where employers seek workers who can apply design and technology skills.<sup>11</sup> This is also reflective of the BC school curriculum redesign for an Applied Skills, Design, and Technologies (ADST) model of learning, emphasizing the importance of the development of these skills in education.<sup>12</sup> Institutional makerspaces can also support talent retention so that graduates continue to have access to resources and tools and as an approach to attracting faculty members. While access to tools and knowledge are valuable ingredients of these spaces, the notion of community is one of the most valued resources in makerspaces. Bringing people together into these physical spaces is where community is built, learning happens, and socializing unfolds.<sup>13</sup>

Similarly, coworking spaces are also rising in popularity as people come together in a movement for community, collaboration, and learning.<sup>14</sup> These spaces often offer amenities such as hot desks, private meetings rooms, kitchens, and coffee. While people often are drawn to coworking spaces for its culture, office firms are also attracted to more flexible space and lower cost as opposed to renting a traditional office space that may not be used frequently.<sup>15</sup> Coworking spaces are appearing in university settings as they provide the opportunity for cross disciplines to come together, breaking up the non-collaborative nature that is common among different disciplines. Hybrid models also exist, in that they consist of a makerspace and coworking space at different scales – from a more formal coworking space to a general communal desk workspace.





Photo credit: Maker Works



# PROJECT METHODOLOGY

In order to understand makerspace models, selection criteria for makerspaces were developed. This report examines eight case studies from Canada and the United States through online research and phone interviews with founders and staff. The interviews allowed for an in-depth understanding of how these makerspaces were established and how they operate as an independent entity or with an institutional affiliation.

The following criterias were used to select relevant case studies:

- Community focused (contributing to social capital, accessible to the public);
- Based in an urban setting (ideally connected to a university);
- Diverse user base;
- Multi-functional space; and
- Has a form of collaboration through interdisciplinary knowledge or post-secondary/external partnerships

## LIMITATIONS

While criteria were developed to choose makerspace case studies that reflected the vision and context of Stadium Neighbourhood (SN), there were limitations. Ideally, case studies would have an affiliation to a university or college, whether located on or off campus. However, it was challenging to reach out to contacts who oversaw these institutional makerspaces. Institutional makerspace may not have dedicated people to respond to email inquiries as they are often student run. In addition, some information such as space size and capital cost were not known to the people who



were interviewed as these spaces are overseen by the university facilities operations. Lastly, many makerspaces were not comfortable sharing their capital cost or monthly rent – their privacy was respected as a result. Due to these limitations, case studies were chosen based on those who responded to the email request for an interview and those who were most willing to share information about their organization. Despite these limitations, there were key takeaways from each case study to inform a makerspace model for SN.



# MAKERSPACE INGREDIENTS

Drawing on literature review, makerspace websites, and interviews, makerspaces are generally made up of three ingredients:



## **Tools**

As makerspaces are grounded in making, they should have access to tools and equipment that allow makers to make. Often makers can not afford these tools or their living space does not have adequate room. Different makerspaces may focus on different types of tools and equipment for specialized kinds of making. However, they generally include, but are not limited to, digital production tools, 3D scanning, laser scanning, woodworking equipment, metalworking equipment, jewellery tools, and sewing machines.



## **Education**

As these spaces allow access to knowledge, education plays a large part. They are always staffed and/or have volunteers during operation hours who have knowledge in the tools and equipment to assist makers or answer questions. Makerspaces often have workshops and classes that are open to the public and members to learn skills and make projects. Education in these spaces encourages informal learning and collaborative idea exchange. They are places where innovation and creativity are fostered.



## **Community**

The core element of makerspaces is the tight knit community that is made up of diverse people and interests. While makerspaces focus on their own members' making and sense of community, many also host free events, maker faires, and children's activities to invite the public into their space. These spaces often have communal areas for members to mingle and meet each other. It is the people and their passion who make these makerspaces thrive.

# CASE STUDY PROFILES



**Maker Cube, Langley, BC**



**MakerLabs, Vancouver, BC**



**Makerspace UBCO, Kelowna, BC**



**MLabs, Victoria, BC**



**Fuse33, Calgary, AB**



**ideaMill, Winnipeg, MB**



**Maker Works, Ann Arbor, MI**



**The HiVE, Vancouver, BC**

Refer to Appendix B: Case Study Information Chart for a detailed overview of the case studies (page 27)

# MAKERCUBE, LANGLEY, BC

Maker Cube is located in an industrial business complex area in Langley that is surrounded by big box stores. Adjacent to Maker Cube is a residential area and Kwantlen Polytechnic University. While there is public transit, the location is more conveniently accessible by car. Started by people in the Surrey community and a few Simon Fraser University students, they began running weekly to monthly meet ups in the Surrey Centre Library in 2014. This was the City's first makerspace. From the Surrey Centre Library, the space grew into an 850 square feet space in the Whalley area of Surrey shortly after. The old space and inconvenient location resulted in challenges of attracting users, leading to the final move in the current location. Maker Cube strives to focus on an education model and to create a safe space for users of all backgrounds.

- Typology: For-profit
- Years of Operation: 3 years total, 1 year in current location
- Space Size: 12,000 sq.ft.
- Success: Built a unique business model in the South of Fraser area that is starved of makerspaces. They are able to serve a larger population than Vancouver and face less competition.
- Challenge: Creating business development was challenging in terms of figuring out sales, income generation, and marketing process to increase exposure.

## Key Takeaways:

- Before people consider membership, Maker Cube will give people a tour of the space to explain their vision and purpose to help people understand what a makerspace is.
- The core component of the space is the people who use and run it out of their passion for making. They are the ones who can make or break the sustainability of the makerspace's operations.



Photo credit: Maker Cube



# MAKERLABS, VANCOUVER, BC

MakerLabs is located in the Downtown East Side, situated in an industrial area with service and retail businesses, such as artists studios, food and furniture manufacturers, and residential homes in close proximity. It is easily accessible by walking, public transit, and driving. MakerLabs began as a pop-up shop under the business name, Laser Cutter Café in Chinatown. Gaining momentum, they moved to another location before moving into the current location. The purpose of MakerLabs is to facilitate making for people who may not have access to tools and equipment.

- Typology: For-profit
- Years of Operation: 5 years total, 3 years in current location
- Space Size: 42,000 sq.ft.
- Success: Implementing and communicating effective policies (i.e. sign out chart, labelling projects) for storing projects and sharing space.
- Challenge: There are a lot of tools in the space, so keeping track of them and ensuring they are not misplaced is not easy.

## Key Takeaways:

- All the studio spaces are built so they can be taken apart and reconfigured. This allows for flexible space and adjustments if expansion and structural changes are needed.
- Try to create space that is not just for makers but also open to the public through maker faires. This creates a more inclusive environment for people who are not exposed to the maker culture.



Photo credit: Emily Huang



# MAKERSPACE UBCO, KELOWNA, BC

Makerspace UBCO is located inside the Engineering, Management and Education (EME) building on the UBC Okanagan campus. Located in room 1256, it is a standard classroom space. Acknowledging the gap in the workforce and advancement, in addition to spurring innovation and design thinking, the vision of establishing a makerspace on the UBCO campus began. It is currently in the demo phase to test the feasibility of maintaining this makerspace for the long-term. This space is open to students, staff, and faculty members, and focuses on prototyping projects. The hope for this space is to be fuelled by the passion and commitment of users using the space and inspiring innovation in students' learning.

- Typology: Non-profit, Institutional
- Years of Operation: 1 year
- Space Size: 800 sq.ft.
- Success: Members on the advisory board represent the demographics of users, ensuring a cross-sectoral involvement with the makerspace's governance and operations.
- Challenge: There are constraints on the physical space and requiring a larger room in the future.

## Key Takeaways:

- The UBCO Provost created a new position, Associate Provost of Learning, to support informal learning spaces and to legitimize the makerspace. There are also a part-time librarian and paid student facilitators to manage the space. This highlights the need for formal leadership of a makerspace to ensure long term sustainability and management.
- It is important to establish an advisory board to determine the structure and design of the makerspace, before securing a space. It is essential that the advisory board is cross-sectoral in nature. The board includes, but are not limited to, diverse faculty members, university staff, and librarians from the Okanagan Regional Library, to represent the demographics of the makerspace, expand learnings, and potential external partnerships.



Photo credit: Makerspace UBCO

# MAKER LABS IN HUMANITIES (MLAB), VICTORIA, BC

M Lab is located in the University of Victoria's Technology Enterprise Facility in room 243. It was established as a contract for a faculty hire to start and run a prototyping makerspace. Prior to opening the space, a working group was established to brainstorm the desires of students for MLabs. This is an experimental space and a hackerspace that focuses on cultural criticism, technology, gender studies, and politics – an unorthodox approach to the traditional idea of makerspace. M Lab attracts students in fine arts and humanities who work on and fix technology, such as historic radios and magnetic recorders, that no longer exists for research purposes and demonstrations.

- Typology: Non-profit, Institutional
- Years of Operation: 7 years
- Space Size: Unable to obtain information
- Success: It is a space where students can conduct their own research (not derivative from faculty) and a space that does not feel driven by tech but by culture. This makes M Lab stand out from other traditional makerspaces that are more tech focused.
- Challenge: Overseeing machinery and showing people how to use them is not easy since it is hard to find student staff who are well versed in tools and equipment.

## Key Takeaways:

- Prior to establishing the space, a working group was formed to ask students what they wanted in the makerspace. This helped bring together ideas to create a space where students are passionate about making and would want to use the space.

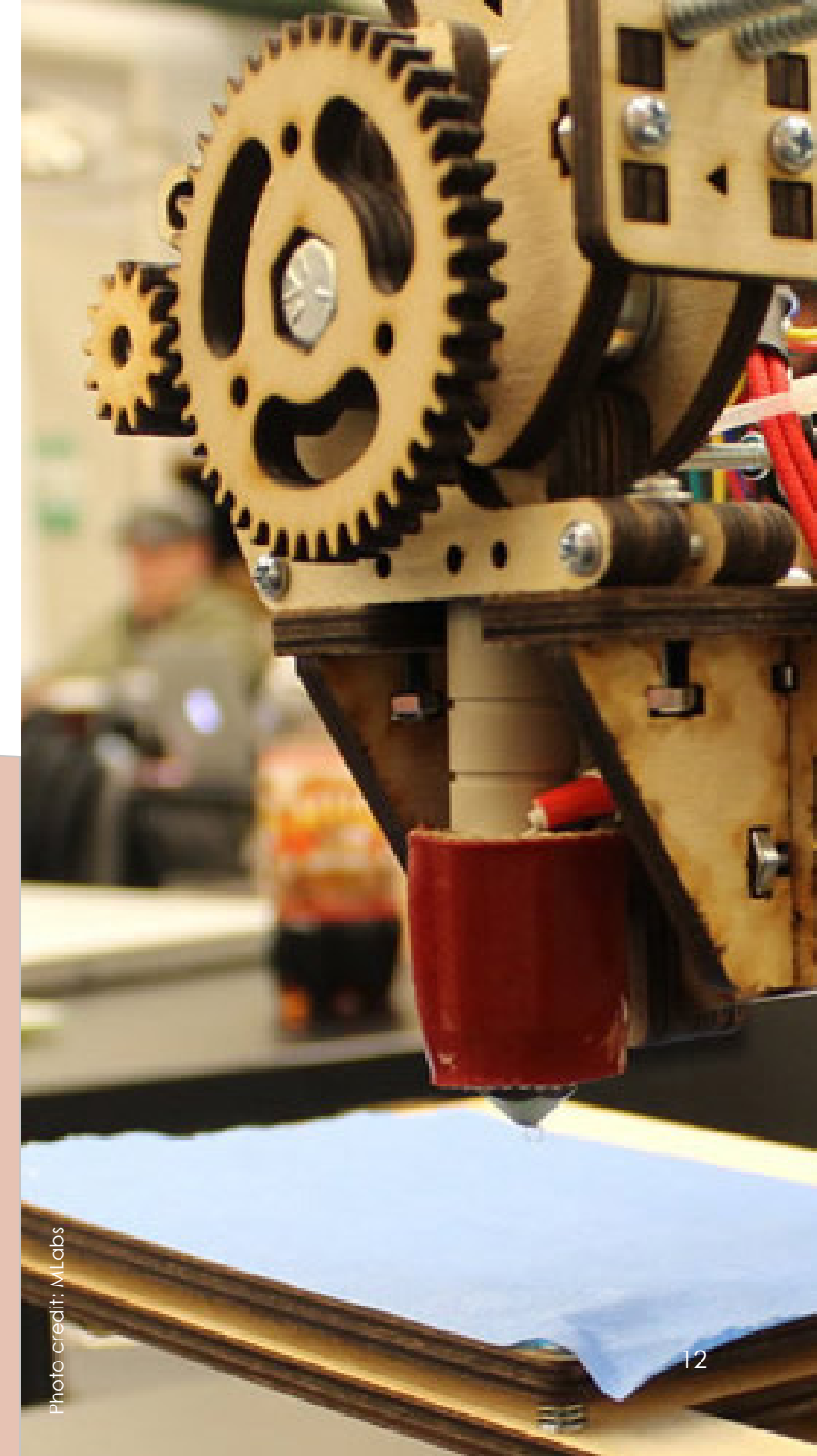


Photo credit: MLabs



# FUSE33, CALGARY, ALBERTA

Fuse33 is located in the Albert Park - Radisson Heights community. It is a residential neighbourhood in the south-east quadrant of Calgary, with adjacent commercial and service retail businesses interspersed throughout the area. Due to an interest in establishing a makerspace in the area, six founders came together to create a low barrier space that welcomed makers of all backgrounds and experience. While the purpose of makerspace is for making, Fuse33 also focuses on creating a safe space that has access to a diverse set of tools in order to attract a variety of users. Their goal is to allow people to earn a living doing what they are passionate about.

- Typology: For-profit
- Years of Operation: 1 year
- Space Size: 9,000 sq.ft.
- Success: Seeing people's business thrive and expand from using the makerspace. Members have been hired after connecting with other members and their business.
- Challenge: The idea of makerspaces is a newer idea and there is often little precedence for local municipalities to follow for right approvals. Getting the City of Calgary's approvals resulted in a challenging experience for the founders due to city bylaws and regulations that were often in conflict with the needs of makerspace (i.e. ventilation and dust collector structures).

## Key Takeaways:

- In order to actively ensure the makerspace is diverse and welcoming to all demographics of people, it is important that the space feels safe for everyone. Offering workshops and classes that appeal to people, especially women who are generally outside the norm of male dominated makerspaces, is one way of creating an inclusive, low barrier space.
- To escalate operations, the makerspace would need at least two paid positions in management and business development. A makerspace that is all volunteer run can be challenging in that volunteers come and go without a long-term responsibility of the space's operations.



Photo credit: Fuse33

# MILLENNIUM LIBRARY ideaMILL, WINNIPEG, MANITOBA

The ideaMill is on the 3rd floor of the Millennium Library located in the South Portage neighbourhood – the heart of downtown Winnipeg. The library is surrounded by the Bell MTS Place which has an indoor arena, museums, malls and the law court. The ideaMill is easily accessible by public transit as the Graham Avenue Transit Mall bus loop is in proximity. However, the North Forge Technology Exchange makerspace is located one kilometre away, which in turn naturally attracts more users. The ideaMill is an open, collaborative space for people who may not have access to technology, tools, and equipment. This space is grounded in the desire to have a makerspace that encourages innovation and community building.

- Typology: Non-profit, Institutional
- Years of Operation: 1 year
- Space Size: Unable to obtain information
- Success: The ideaMill offers a variety of classes for people of all ages, staff is always there to assist users with software and equipment and is free to access.
- Challenge: May not attract as many users since the Millennium Library is across the city, while also competing with North Forge Technology Exchange makerspace that runs entrepreneurially, receives significant funding, and has a formalized partnership with the University of Manitoba.

## Key Takeaways:

- The ideaMill space is constantly evolving through the needs and wants of its users. They keep track of a list where people can note down the type of tools and equipment they want in the space.



Photo credit: ideaMill



# MAKER WORKS, ANN ARBOR, MICHIGAN

Maker Works is located in an industrial business area outside the City of Ann Arbor, with businesses such as product manufacturing, design studios, and food retail services. It is near the Ann Arbor Municipal Airport, with adjacent suburban residential housing as well. The establishment of this makerspace started after the U.S. economic crisis, sparking the idea to create a space for innovation to strengthen Ann Arbor's economy. The location is also not easily accessible by public transit and is four to five miles away from the University of Michigan. As a result, students do not make up a significant portion of Maker Works' users. Maker Works attracts people with diverse skills, but mostly those with associated income streams, such as start-ups and small business owners.

- Typology: For-profit
- Years of Operation: 8 years
- Space Size: 14,400 sq.ft.
- Success: A business model was created that has a clear mission, vision, goals, and guiding principles, which streamlined Maker Works' operations. They made sure to hire staff who have experience in tools and equipment, resulting in easier training.
- Challenge: While they have staff who do social media, they can elevate their marketing to increase exposure.

## Key Takeaways:

- In the beginning stages of the makerspace's establishment, many public tours were given in order to increase their growth and exposure. Maker Works attending local events and community programs to talk about the purpose of the makerspace were important as well.
- The makerspace uses Standard Operating Procedure\*<sup>16</sup> and 5-S (sort, set in order, shine, standardize, sustain) framework\*<sup>17</sup> to increase operational efficiency.

\*Standard Operating Procedures are step to step instructions written by an organization to assist workers in carrying out complex tasks, creating a more efficient system and uniform performance.

\*A framework that is philosophically grounded in creating a clean and organized workspace, while reducing waste and creating a stream-lined process.



Photo credit: Maker Works



# THE HiVE, VANCOUVER, BC

Located in Gastown, the HiVE is a second level walk up. The building is surrounded by commercial, retail, and food services in the heart of Downtown Vancouver. The nature of its location allows for high foot traffic and is easily accessible by public transit. With the purpose of providing space for people who want to make the world a better place through social impact work, this space attracts a diversity of people and builds a sense of community. As the future of work is changing, there are fewer people working 9-5 jobs and the risk of isolation increases. The HiVE as a coworking space is reflective of this culture shift and strives to create an environment where people have the opportunity to meet and collaborate.

- Typology: Non-profit
- Years of Operation: 7.5 years
- Space Size: 12,000 sq.ft. total (two separate spaces are located across the hall from each other at 9,000 sq.ft. and 3,000 sq.ft.)
- Success: The HiVE creates an environment where people meet and ideas are exchanged, resulting in members hiring members for their own business and collaborating on new work.
- Challenge: The physical space is old and lacks wheelchair accessibility since it is a two storey walk up building. There is currently not enough funding to create accessibility. Due to its prime location in Gastown, rent is very expensive and continues to increase.

## Key Takeaways:

- Started “jelly” meetups where people get together informally to work on something of their own. This helped with the early engagement of people to test the feasibility of establishing a coworking space. “Jelly” meetups in combination with the founders tapping into their network helped form a community of interested people before securing a place. This ensures the likelihood of the space going out of business is low if it starts with a strong community.



Photo credit: Emily Huang



# HiVE



SUCCESS

ADDDING SKILLS

TRUST INDIVIDUAL IMPORTANT

CHALLENGED

TOGETHER

COMMUNICATION

LEARNING

BASED

COLLABORATION

UNITED

PRODUCTION

MANAGEMENT

GROUPS

WORK

PROJECT HELP

BETWEEN

POLITICAL

PEOPLE

COLLABORATIVE

COMMUNITIES

SOFTWARE

GOAL CITATIONS

INTERNET

SYSTEM SENSE

LEADERSHIP

PERFORMANCE

PRACTICE EDUCATION

MEMBERS

SCIENTIFIC

ORGANIZATION

SOCIAL

- Twitter: HiVE Vancouver
- Instagram: HiVE.socialimpact
- YouTube: hive.vancouver
- LinkedIn: HiVE.sweetsocialimpact



# DISCUSSION AND RECOMMENDATIONS

## BUSINESS MODELS ARE KEY TO SELF SUSTAINING MAKERSPACES

When operating a makerspace, some case studies touched upon their business model but not all discussed it in depth. However, there are important specificities that should be considered when building a business model to ensure sustainable operations in the long run. While Artisan's Asylum in Somerville could not be reached for an interview, they are known as one of the major makerspaces in the area and is very established as a result. Artisan's Asylum works with makers who are interested in starting their own space. Considerations for creating a business model is based on their "Making Makerspaces: Creating a Business Model" blog post for MAKE Magazine.

Space size considerations will determine a makerspace's expense and income, from small teaching space to a large stand-alone industrial space, and how much staff, tools, and resources are needed to operate.

### Expense:

- Tools and equipment – the type and number of tools will determine the cost to acquire them and their maintenance.
- Rent, property tax, and utilities – this is the largest expense and will

drive the rest of the business plan.

- Salaries – workers are either paid full-time, part-time or work as volunteers. To escalate operations, makerspace may require a few paid staff in management positions.
- Tool maintenance – Having a system in place to ensure members are taking care of tools will ensure a longer life span and may decrease monthly maintenance expense.
- Class instructors – Expense will be affected based on whether instructors are own members or hired externally, and how much they are paid (i.e. 50% of class proceeds).
- Miscellaneous – snacks, tea, coffee, office supplies

### Income:

- Tiered membership fees – The main income stream for for-profit case studies. Generally, case studies reveal individual fees that range from drop-in maker fee of \$25/day to 24/7 space access of \$150/month.
- Office and space rental – Most case studies reveal this as a secondary income stream after membership fees.
- Classes and workshops – Case studies, excluding institutional makerspaces, are generally charging \$40/class.
- Fabrication projects – Members or non-members can pay a cost for a fabricator to make a project for them. MakerLabs' fee is ~ \$2-\$3/minute with ~ \$25 minimum charge.
- Tools orientation and safety training – Some case studies offer this for free while others require members to pay a fee to enroll in training.
- Grants and donations – Commonly accessed by non-profit and

institutional makerspaces. Case study examples include dedicated institutional budget, government loans, or organizations that support entrepreneurs.

## STAFF IN RESPONSIBLE AND MANAGEMENT POSITIONS ARE KEY FOR OPERATIONS

All the case studies have very similar operation models in that they have paid staff and volunteers working on site during operation hours. Different makerspaces have different levels of responsibilities for staff and volunteers. They are generally responsible for giving tours, maintenance, machine operation, giving classes, answering questions, and oversight and governance. Some makerspaces would rely more on volunteers as there is not enough financial means to pay them, while others operate all on paid staff. Fuse33 acknowledges that while it is good to have volunteers, it is important to have people in responsible paid positions to escalate operation. Similarly, Makerspace UBCO stresses the importance of having a director to overlook the management of the space for it to be sustainable. That said, the University of Victoria's Maker Labs in Humanities (MLab) mentions that it is necessary to pay students who are well versed in machinery – an area that they find challenging in seeking students who have these skills and knowledge.

The case studies generally rely on membership fees to run the space, with the exception of the institutional makerspace case studies. However, spaces such as MakerLabs and the HiVE offer a bartering system for members who can volunteer their time in return for membership. This offers more accessibility to those who want to work in a makerspace but may not have the financial means.

All the makerspace case studies require members to sign for liability and take a mandatory training class before using tools and machines. Makerspace UBCO describes this model as a way to protect equipment and unskilled users. Likewise, to ensure efficiency and safety, Maker Works uses the Standard Operation Procedure (SOP) model and the 5S (Sort, Set In order, Shine, Standardize, and Sustain). These models ensure efficiency, high performance, and workplace organization. It also assists in minimizing waste and wasted time, through ways such as organizing tools on the wall visually.

For-profit makerspaces such as Maker Cube and Fuse33 mention the constraints of institutional affiliations, such as operating hours and staffing. Likewise for MLab, operating as an institutional makerspace, experiences struggles finding student staff who have the right experience and knowledge to operate tools and equipment.



# MEMBERSHIP FEES AND INSTITUTIONAL BUDGET ALLOCATION ARE THE PRIMARY FUNDING STREAMS

There are five out of eight case studies that established their makerspace through investors, government loans, and personal savings. These five spaces are for-profit makerspaces that rely mostly on membership fees for their income. Renting out offices and meeting rooms make up a secondary income stream as well as people paying fabricators to build a project for them, such as the case at MakerLabs. Other forms of income streams include Maker Works and Fuse33 that build partnerships with community groups who want to learn skills or host a community children's event. Educational lessons are also carried out through schools or community centre visits.

On the other hand, Makerspace UBCO, MLab, and the ideaMill are non-profit institutional makerspaces that rely on grants or through budget allocation by the respective institutions, such as The Millennium Library's strategic plan for the ideaMill. Makerspace UBCO currently charges no membership fees in hopes of attracting more students and building interests. However, they may consider moving towards a membership fee model which could become part of student tuition fees in order for it to be sustainable in the long run and create a sense of value for users.

# CROSS-SECTORAL SYNERGY IS ESSENTIAL FOR PLANNING PROCESS AND MARKETING

Acknowledging the need for innovation and tech is very common across makerspaces, resulting in their initial planning process. Before establishing these spaces, it was important to have some form of community engagement and leverage community members and allies who support these projects. By carrying out community engagement, the founders gathered ideas for what the community desired in a makerspace. The HiVE did preliminary "jelly" meet ups by having people meet at a place to engage and exchange ideas with each other early on in the process. This is important to have an interested community first before finding an appropriate location. Maker Works created a business framework because they believed in having a clear mission, vision, goals, and concrete plans for a self-sustaining makerspace. Moreover, it is important that people understand the vision of a makerspace. As a result, members of Makerspace UBCO's steering committee emphasize developing a communication strategy that raises awareness of the makerspaces purpose to build momentum. On the other hand, Maker Cube gives tours around their space before revealing membership pricing to help people understand the purpose of their space.

Through an institutional lens, Makerspace UBCO's goal was to create a space for innovation and design as this was recognized as an important component of student learning. It was also recognized that design thinking and prototyping positioned UBCO within all faculties, from nursing to engineering to the arts. As a result, a cross sectoral advisory board was created, represented by diverse faculty members, staff – from janitors to administration, who talked about the structure and initial design before establishing a space. External members such as a librarian from the

Okanagan Regional Library also sits on the board to exchange ideas and learnings due to increasing makerspaces existing in libraries. By having an advisory board that represents the demographics of the community, they become the champions for a successful makerspace. Nonetheless, a member of the advisory board acknowledged that they did not have a strong strategy to build critical mass and this is crucial in getting people to understand the vision.

Although some makerspaces, such as Maker Works and Maker Cube would like to elevate their marketing, many makerspaces use social media to gain exposure, especially before opening the space. During operations, free tours are also available for the public, noting it as a critical role in attracting new members for Maker Works. Attending local universities and hobby clubs, hosting free events were also integral to makerspaces' growth at the beginning stages. Other ways include word of mouth or simply through people looking online for a specific need, such as the experience with MakerLabs. Hosting community events such as maker faires are also an important component to bring in people who may not be familiar about makerspaces.

## COMMUNITY ORIENTED AND LOW BARRIER SPACE CREATE OPPORTUNITIES FOR INFORMAL LEARNING AND INNOVATION

Makerspaces are for making, collaborative work, and accessing diverse tools. However, the heart of these spaces are community oriented – reflecting community centres. As more people are living alone, the risk of isolation increases. The increasing number of people who live alone

also result in having less space for storing tools. Speaking to makerspaces, many founders and staff emphasized their space as low barrier to bring in a diverse crowd for collaboration and innovation. The founder of Fuse33 said that he actively ensures his space is diverse and safe for everyone. This includes making sure the tools and workshops are also geared towards women and those who may be outside the norm of makerspace culture. This is carried out by having a diverse range of workshops and tools, such as sewing machines and jewellery machines, rather than the traditional tools – woodworking and metalworking machines. This is echoed by Maker Cube's founder who believes that a safe space and a diverse range of tools would make it an irresistible place for people to come together. There is a continuous desire to reach out to the local community and cater to their needs through community events and educational workshops.

Makerspace UBCO's vision to establish a makerspace grew from the acknowledgement that there is a gap between the workforce and advancement, making design and innovation crucial in education. It is emphasized that makerspaces provide room for informal learning that is often in contrast to the formal learning environments in classrooms. Similarly, the professor and founder of MLab stressed the importance of informal and experimental learning as the university seldom provides these opportunities for students. This fosters creativity when users share the same physical space for knowledge transfer and ideas. Moreover, these spaces are designed to be a social space in what Makerspace UBCO refers to as a 'third space' for community building. At the end of the day, it is the users who fuel the success and sense of community within these spaces.

On the other hand, some challenges of makerspaces being an accessible space include the location. Maker Works, for example is located four to five miles away from the University of Michigan, making it hard for students to access especially without adequate bus services to the area. Likewise, ideaMill finds it challenging to attract more people because the library is located across the city. As a result, accessible, visible, and walkable are key in gaining publicity and awareness, reflecting the Starbucks model to locate on the busiest street corner.



# THE SPACE SHOULD BE PHYSICALLY ACCESSIBLE AND FLEXIBLE TO CHANGES

Physical space requirements and challenges were echoed by a few makerspaces. As opposed to the HiVE being solely a coworking space, some makerspaces also have a quiet computer work space on the second floor of their building. Most importantly, having a communal area is important for the community to come together and have informal conversations over tea and coffee. Maker Cube mentions the need to have a large clean space with standard industrial ceiling height and ground loading at the back as well. Their previous location in Whalley, Surrey was an old space with a second floor walk up, making it unsuitable for tools and equipment storage as well as attracting more people. Their decision to move to their current location in Langley was also driven by the lower competition and ability to serve an area that was starved of makerspaces. The HiVE's space is currently located on a second floor walk up, with staff noting the flight of stairs to get to the entrance is not very accessible, in addition to the lack of wheelchair accessibility.

In terms of flexible space, MakerLabs studio spaces are built with wooden frames, making it easy to remove and change as the space expands. It is also important to be mindful of noise which can be an issue for neighbours if it is located in a mixed-use building or in a residential area. It is important to plan the space carefully if there is a hybrid makerspace and coworking space. Considerations include noise and cleanliness, tool and equipment maintenance, and the combination of different uses and users in close proximity to each other.



Photo credit: Emily Huang



# NEXT STEPS AND FURTHER RESEARCH

This report identifies case studies for best practices in establishing a makerspace. Through a scan of relevant case studies, interviews, and the support of literature reviews, this research reveals that makerspaces are made up of three ingredients, regardless of the type of space. They include tools, education, and community that help attract and create a thriving environment for users. Interviews were conducted to further understand the needs, considerations, success and challenges, and planning process that went into the establishment of these makerspaces. Not all case studies are affiliated with an academic institution; however, lessons learned from the identified six key themes are still valuable for Stadium Neighbourhood. While key themes and considerations are highlighted, considerations and future research could:

**Conduct research of small-scale collective resource spaces, such as the Vancouver Tool Library, and consider piloting pop-up makerspaces to engage the community.**

These small-scale spaces can be implemented more quickly than makerspaces and at a lower cost to test their feasibility. Carrying out pop-up makerspaces in the community can help gauge interest, understand the type of makerspace that the community wants, and bring awareness to the purpose of makerspaces. This is important in understanding the community's needs and desires that the makerspace hopes to serve. By understanding the community, this can help inform the appropriate type of makerspace.

Example: The Makery, New York

The Makery is a moveable and temporary space for digital design and fabrication, electronics, physical computing, engineering, art and creative coding for all ages. Store fronts, atriums, art galleries, and historic homes are transformed into pop up makerspaces for children and adults.



Photo credit: The Makery

**Consider partnerships with faculties and external entities, such as the Faculty of Education, Faculty of Applied Science, and the Vancouver Public Library, who play a role in facilitating design thinking, technology skills, and community spaces.**

The Faculty of Education at UBC, for example, trains prospective graduates in BC's redesigned learning curriculum - Applied Skills, Design, and Technologies (ADST). Opportunities can be explored to work with and leverage a network of partners, on and off campus, to deliver a sustainable makerspace operation model.

Possible partnerships could involve the UNA Green Depot - a community recycling centre located at Wesbrook Community Centre for residents, UBC staff, faculty, and students for waste disposal or repurposing. The Green Depot is experiencing a surplus amount of recycled items that may still be in good condition. Possible partnerships with the centre could result in a form of a lending library where community members can borrow items that may otherwise be donated to thrift stores.

**Conduct research of planning policies and incentives that support makerspaces.**

Some case studies, such as Fuse33 described challenges and restrictions with the local municipality during the planning and construction process of their makerspace. Other makerspaces revealed their preference to not partner with institutions due to limited freedom in determining how they can operate their space. UBC C+CP functions with its own policies and regulations which allows for greater flexibility in the projects that could be feasible. However, further research on municipal policies and incentives that can support or restrict makerspaces could be beneficial in the early building design stages to ensure all the necessary requirements for a makerspace are accounted for.

**Examine land use restrictions and building design as an approach to address noise and odour concerns.**

This can help expand on approaches to mitigate noise and odour issues for makerspaces that are in close proximity to commercial and residential uses. To deal with these concerns, a variety of building design approaches could be applied, such as Artisan's Asylum's internal wall barriers to ensure odour and noise do not affect neighbouring residents.





# APPENDICES



light  
work

DesignLab

Co-Working  
Space

SPUD.CA

MOLSON  
CANADIAN



# APPENDIX A: UBC WORKSHOP LOCATIONS MAP



# APPENDIX B: CASE STUDIES INFORMATION CHART

STATS								FINANCE & OPERATIONS				SITE & BUILDING CONSIDERATIONS		
Name	Location	Typology	Years in Operation	Size of Space (Square feet)	Space	Capital Cost and Source	Annual operating cost	Operation model	Funding model	Built Environment	Ceiling height	Number of floors	Loading docks	Parking availability
<b>MakerLabs</b>	Vancouver, BC	For-profit	2 years in old site, 3 years in current location	42,000	Workshop, private studio, common area	\$500,000, founders' personal savings	\$500,000 annual operation cost (excluding rent); rent: \$70,000/month	MakerLabs has ten paid staff and five volunteers. The fabrication team operates separately from the team. Community managers work at the front desk, manage books, volunteers, manage fabrication projects, and scheduling. Volunteers are offered space and membership for their hours.	The majority of the income is from membership (includes coworking space and renting rooms) and fabrication projects. Income is reinvested back into MakerLabs.	Located in the Downtown East side, characterized by an industrial area with service and retail businesses and residential homes in close proximity.	Standard - Industrial	2	2 at grade, 1 at truck level	Yes
<b>Maker Cube</b>	Langley, BC	For-profit	2 years in old site, 1 year in current location	12,000	Workshop, private studio, rooms, common area	Unable to obtain information	Unable to obtain information	Maker Cube is operated by three founders with around four volunteers who run operations and classes. The space runs 4 classes a week as there is a large focus on the education model.	The majority of the income is from membership fees, some form of government loans, and Futrepreneur (a non-profit organization that helps fuel aspiring businesses).	Located in an industrial area, surrounded by big box stores. Adjacent to Maker Cube is a residential area and Kwantlen Polytechnic University.	Standard	2	6	Yes
<b>Makerspace UBCO</b>	Kelowna, BC	Non-profit	1 year	800	Prototyping space	Institutional Training Authority BC and UBCO Provost. Received one time funds of \$325,000 with private donor money (not considered capital cost)	Uncertain due to short operation period	Makerspace UBCO is overlooked by the UBCO Associate Provost with a part-time librarian. An advisory board is made up of a diverse range of faculty members and staff, such a janitorial and administration. Current use is only open to UBCO affiliated people, rather than the public. UBCO extended an additional two years to test the sustainability of this makerspace.	One time donor and Provost money. The vision is to attract more students before considering a membership fee.	Located in room 1256 of the Engineering, Management and Education (EME) building on University of British Columbia Okanagan (UBCO) Campus.	Standard	1	0	UBCO campus parking in close proximity
<b>Maker Lab in the Humanities (MLab)</b>	Victoria, BC	Non-profit	7 years	Unable to obtain information	Prototyping space	Institutional funding and external grants	Unable to obtain information	MLab has a core team of eight to ten paid staff who are full time, while the rest is part time. They run three to four workshops throughout the year, including visiting local schools to do workshops and present.	MLab does not charge membership fees for its users. The space relies on grant such as the Canada Foundation for Innovation, the Social Sciences, Humanities Research Council of Canada, and the British Columbia Knowledge Development Fund.	Located on the University of Victoria's (UVic) campus in two separate buildings. One building houses the computing lab, the other building houses the visual arts space linked with a workshop.	Unable to obtain information	1	0	UVic campus parking

STATS								FINANCE & OPERATIONS				SITE & BUILDING CONSIDERATIONS		
Name	Location	Typology	Years in Operation	Size of Space (Square feet)	Space	Capital Cost and Source	Annual operating cost	Operation model	Funding model	Built Environment	Ceiling height	Number of floors	Loading docks	Parking availability
<b>Fuse33</b>	Calgary, BC	Non-profit	1 year	9,000	Workshop, coworking space, communal space	\$400,000 for 6 months; private investors and personal savings	Unable to obtain information	Fuse33's goal is to provide low barrier access to diverse tools. Everyone who works in the space is a volunteer since there are limited financial means for paid staff at the moment. Workshops and classes are available to members.	Fuse33 have different levels of membership fees which is currently their main source of income.	Located adjacent to service, retail, and food businesses with residential homes in close proximity.	9 - 20 feet	2	4 overhead garage doors	Yes
<b>Millennium Library IdeaMill</b>	Winnipeg, MB	Non-profit	1 year	Unable to obtain information	Workspace and studios	City funds of \$500,000 (\$400,000 for renovations, \$100,000 for tools, software, and supplies)	\$10,000 annual operation cost	The IdeaMill is overlooked by a librarian with various library staff who manage and assist people in using tools, equipment, and digital softwares. A safety and liability form is required before using the space. A range of community classes and workshops also operate throughout the week.	Yearly proposal put in for ongoing operating budget of \$100,000.	Located on the third floor of the Millennium Library in the South Portage neighbourhood of downtown Winnipeg.	10 feet	1	0	Yes
<b>Maker Works</b>	Ann Arbor, MI	For-profit	8 years	14,400	Workshop, coworking space, office, communal space	\$200,000, founders' personal savings and investments	\$340,000 (USD) annual operation cost; 120,000 (USD) rent	MakerWorks was established through a business model that was grounded in a clear vision, goals, principles, and plans. There are ten full time paid staff with a few others who are part-time. They operate based on the "Standard Operating Procedure" (SOP) to streamline operations, elevate member experience, and ensure high quality maintenance of tools. Their operations are also grounded in the 5 S-ings (sorting, shining, setting in order, sustaining, standardizing) which minimizes waste and maintains organization.	Maker Works' income stream comes from 50% membership, 25% classes, and 25% renting out offices and space.	Located in an industrial business area outside the City. It is near the Ann Arbor Municipal Airport, with suburban residential housing adjacent to the industrial business area.	8 - 18 feet	1	2 truck loading docks, 2 overhead garage doors; 1 double door entrance; Industrial lights are key to ensure bright space	Yes
<b>The HiVE</b>	Vancouver, BC	Non-profit	7.5 years	12,000	Coworking space	Founders' personal savings and Vancity loan	\$154,000 to \$287,000 annual operation cost; rent: \$21/sq.ft/ month with an additional \$9,500/ month	The HiVE has eight to ten members who are on the board of directors. There are two full time paid staff who does oversight and governance, with others who are volunteers. Front desk consist of seven 'desk bees' who trader their hours for memberships. Users can buy different types of memberships depending on desk needs, from shared desk, to personal desk to own private office space, and mail boxes only customers.	The HiVE's stream of income comes from membership fees, event space rentals, and office space rentals.	Located in Gastown, the HiVE is a second level walk up. The building is surrounded by commercial, retail, and food services in the heart of Downtown Vancouver. The nature of its location allows for high foot traffic and is easily accessible by public transit.	Standard - Industrial	1	0	Yes, street paid parking

# ENDNOTES

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<sup>15</sup> Bruggeman, R., Driever, D., & Donkers, W. (2018). The rise of co-working space and the need for smart buildings.

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